

# CALEB A. BUAHIN

*Curriculum Vitae*

Phone: (801) 897-8517

E-mail: [caleb.buahin@gmail.com](mailto:caleb.buahin@gmail.com)

## Education

---

- Ph.D. Civil and Environmental Engineering** Dec. 2017  
Utah State University, Logan, Utah  
Dissertation: Advancing the Cyberinfrastructure for Integrated Water Resources Modeling.  
Advisor: Jeffery S. Horsburgh
- M.S. Civil and Environmental Engineering** Dec. 2010  
Brigham Young University, Provo, Utah  
Advisor: E. James Nelson
- B.S. Civil and Environmental Engineering** Dec. 2010  
Brigham Young University, Provo, Utah

## Professional Experience

---

- Postdoctoral Research Fellow** Sept. 2017 - Present  
Utah State University, Logan, Utah  
Advisor: Bethany T. Neilson
- Co-Instructor - GIS for Civil Engineers** Jan. 2017 - Apr. 2017  
Utah State University, Logan, Utah
- Teaching Assistant - GIS for Civil Engineers** Jan. 2015 - Apr. 2017  
Utah State University, Logan, Utah
- Graduate Research Assistant** Aug. 2013 - Sept. 2017  
Utah State University, Logan, Utah
- Project Engineer** Jan. 2011 - Aug. 2013  
Environmental Resources Management Inc.,  
Exton, Pennsylvania
- Software Engineering Intern** 2010  
Aquaveo LLC, Provo, Utah
- Civil Engineering Intern** 2010  
United Research Corporation, Salt Lake City, Utah
- Graduate Research Assistant** Jan. 2009 - Dec. 2010  
Brigham Young University, Provo, Utah

## Research Interests

---

My research interests are centered on the hydrological modeling and hydroinformatics fields in general with an emphasis on 1) developing and applying hydrologic and hydrodynamic models to investigate the dynamics that occur at the intersection between engineered water infrastructure, hydrological, and ecological systems; 2) deploying machine learning algorithms and other techniques to optimize the management tradeoffs between these systems; and 3)

integrating models and environmental information systems to promote reproducible science and support more comprehensive assessment of water systems. My past research was focused on advancing standardized modeling frameworks to allow modelers to couple earth systems models in a “plug-and-play” fashion to support more holistic evaluations of human-natural water systems. Using applications in urban stormwater management and stream temperature modeling, I have investigated how to resolve scaling mismatches and conduct parameter estimation and uncertainty assessment efficiently within integrated modeling frameworks. Currently, I am applying these frameworks to investigate critical spatial and temporal scales for groundwater-surface water exchanges and their implications for heat and solute exchanges in rivers with significant human mediation.

### Awards

---

<i>Fellow of the OpenMI Association</i> The OpenMI Association	2019
<i>Outstanding Reviewer</i> Environmental Modeling and Software	2018
<i>Best Student Paper and Presentation</i> International Environmental Modeling and Software Society Biennial Congress	2016
<i>Martin Luther King Fellowship</i> Utah State University, Office of Research and Studies	2016
<i>Outstanding Graduate Scholar Award</i> Utah State University, College of Engineering	2016
<i>Visiting Scholar</i> National Flood Interoperability Experiment Summer Institute, National Water Center, University of Alabama, Tuscaloosa, Alabama	2015
<i>Doctoral Research Fellowship</i> iUTAH and the Utah Water Research Laboratory, Utah State University, Logan, Utah	2013 – 2017
<i>Graduate Student Finalist</i> Paul J. Riley Student Conference and Paper Competition, American Water Resources Association, Utah Section	2010
<i>Undergraduate Student Winner</i> Paul J. Riley Student Conference and Paper Competition, American Water Resources Association, Utah Section	2009

### Publications and Presentations

---

#### *Journal Papers in Print or Press*

---

**Buahin, C.A.**, Horsburgh, J.S., Neilson, B.T., 2019. Parallel multi-objective calibration of a component-based river temperature model. *Environmental Modelling & Software*. In press.  
<https://doi.org/10.1016/j.envsoft.2019.02.012>

- Buahin, C.A.** and J.S. Horsburgh (2018). Advancing the Open Modeling Interface (OpenMI) for Integrated Water Resources Modeling. *Environmental Modelling & Software* 108:133–153.  
<https://doi.org/10.1016/j.envsoft.2018.07.015>
- Buahin, C. A.**, Sangwan, N., Fagan, C., Rae, C., Maidment, D. R., Nelson, J. E., Horsburgh, J. S., Merwade, V. (2017). Probabilistic Flood Inundation Delineation Using a Rating Curve Library Approach, *Journal of the American Water Resources Association (JAWRA)*.  
<https://doi.org/10.1111/1752-1688.12500>
- Buahin, C. A.** and J.S. Horsburgh (2015). Evaluating the Simulation Times and Mass Balance Errors of Component-Based Models: An Application of OpenMI 2.0 to an Urban Stormwater System. *Environmental Modelling & Software* 72:92–109.  
<https://doi.org/10.1016/j.envsoft.2015.07.003>
- Hale, R.L., A. Armstrong, M.A. Baker, S. Bedingfield, D. Betts, **C. A. Buahin**, M. Buchert, T. Crawl, R.R. Dupont, J.R. Ehleringer, J. Endter-Wada, C. Flint, J. Grant, S. Hinners, J.S. Horsburgh, D. Jackson-Smith, A.S. Jones, C. Licon, S.E. Null, A. Odame, D.E. Pataki, D. Rosenberg, M. Runburg, P. Stoker, and C. Strong (2015). iSAW: Integrating Structure, Actors, and Water to Study Socio-Hydro-Ecological Systems. *Earth's Future*.  
<https://doi.org/10.1002/2014EF000295>
- Williams, G.P., O. Obregon, E.J. Nelson, W. Miller, M.B. Borup, and **C. A. Buahin** (2014). Sensitivity of Water Quality Indicators in a Large Tropical Reservoir to Selected Climate and Land-Use Changes. *Lakes & Reservoirs: Research & Management* 19:293–305.  
<https://doi.org/10.1111/lre.12079>

### *Journal Papers in Review/Preparation*

---

- Buahin, C.A.**, B.T. Neilson, M.B. Cardenas, S. Ferencz (2019). Numerical investigations of groundwater-surface water solute and heat exchanges under discontinuous flow conditions. *Water Resources Research*. In preparation.
- Mihalevich, B.A., B.T. Neilson, J.C. Schmidt, D. Rosenberg, D. Tarboton, **C.A. Buahin** (2019). Development of a dynamic river temperature model for the Colorado River within Grand Canyon. *Water Resources Research*. In preparation.
- Buahin, C.A.**, B.T. Neilson, D. Rosenberg, Jack C. Schmidt, B. Mihalevich (2019). Many-objective design of sub-monthly environmental flow releases from Glenn Canyon Dam using a coupled temperature model. *Water Resources Research*. In preparation.

### *Theses*

---

- Buahin, C. A.** (2017). Advancing the Cyberinfrastructure for Integrated Water Resources Modeling, Ph.D. Dissertation, Utah State University, Logan, Utah.  
<https://digitalcommons.usu.edu/etd/6901>

### *Conference Proceedings Papers*

---

- Buahin, C. A.** and J. S. Horsburgh (2016). From OpenMI to HydroCouple: Advancing OpenMI to Support Experimental Simulations and Standard Geospatial Datasets, In: Proceedings of

---

the 8<sup>th</sup> International Congress on Environmental Modelling & Software, 11-14 July, Toulouse, France.

**Buahin, C. A.**, E.J. Nelson, O. Obregon, and G.P. Williams (2011). Dynamic Multidimensional Visualization for Water Quality Data in Rivers. World Environmental and Water Resources Congress 2011, American Society of Civil Engineers, 4811–4819.  
[https://doi.org/10.1061/41173\(414\)499](https://doi.org/10.1061/41173(414)499)

**Buahin, C. A.**, R. Hila, T. Rabadi, O. Obregon, R. Chilton, A. Childers, G. Williams, and E.J. Nelson (2010). ArcGIS Tools for Storing and Analyzing Reservoir Vertical Profile Data. AWRA 2010 Spring Specialty Conference. Orlando, FL.

**Buahin, C.A.** (2010). "Spatial Interpolation Techniques for Dynamic Isopleth Map Generation in Assessing Water Quality in Rivers." J. Paul Riley Student Conference and Paper Competition, AWRA Utah Section.

---

### *Conference Posters and Presentation*

---

Mihalevich, B.A., B.T. Neilson, J.C. Schmidt, D. Rosenberg, D. Tarboton, **C.A. Buahin** (2018). A dynamic river temperature model for the Colorado River within Grand Canyon. 2018 Fall Meeting, AGU, Washington, D.C.  
<https://agu.confex.com/agu/fm18/prelim.cgi/Paper/452497>

**Buahin, C.A.**, J.S. Horsburgh, and B.T. Neilson (2018) Enabling High-Performance Heterogeneous Computing for Component-Based Integrated Water Modeling Frameworks. 9th International Congress on Environmental Modelling and Software. Fort Collins, Colorado.

**Buahin, C.A.**, J.S. Horsburgh, and B.T. Neilson (2018) Enabling High-Performance Heterogeneous Computing for Component-Based Integrated Water Modeling Frameworks. 9th International Congress on Environmental Modelling and Software. Fort Collins, Colorado.

**Buahin, C.A.** and J.S. Horsburgh (2017). HydroCouple: Advancing Component-Based Modeling Frameworks for Integrated Water Assessment. 25<sup>th</sup> NSF EPSCoR National Conference Missoula, Montana.

**Buahin, C.A.** and J.S. Horsburgh (2016). From OpenMI to HydroCouple: Advancing OpenMI to Support Experimental Simulations and Standard Geospatial Datasets. Environmental Modelling and Software for Supporting a Sustainable Future. Toulouse, France, pp. 153–160.  
<https://scholarsarchive.byu.edu/iemssconference/2016/Stream-A/11/>

**Buahin, C. A.** and J. Horsburgh (2015). Computational Penalties of Component Based Models: An Urban Stormwater Component-Based Modeling Application Using OpenMI. Spring Runoff Conference. Utah State University.  
<http://digitalcommons.usu.edu/runoff/2015/2015Posters/38>.

---

*Invited Presentations*

---

**Buahin, C. A.**, B.T. Neilson, J.S. Horsburgh (2018). Heat and Solute Transport Modeling Using the Component-Based Modeling Paradigm. Utah State University Civil Engineering Water & Environmental Seminar.

**Buahin, C. A.** and J. Horsburgh (2017). The HydroCouple Component-Based Modeling Framework. The OpenMI Association Technical Committee Meeting.

---

**Teaching Experience**

---

*Courses*

---

Geographic Information Systems for Civil Engineers 2015- 2018  
Utah State University, Logan, Utah

---

**Professional Activities**

---

*Professional Memberships*

---

American Society of Civil Engineers.  
The International Environmental Modelling and Software Society

---

*Reviewer*

---

Environmental Modelling & Software  
Journal of the American Water Resources Association  
Lakes & Reservoirs: Research and Management  
Hydrology and Earth System Sciences